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Climate Situation in 5 Top-Rated Tourist Attractions in Thailand Investigated by Using Big Data RSS Feed and Programming

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Abstract

The concern about rising global temperatures is powerful in its effect on the tourism economy sector in the top 5 tourist attractions in Thailand. This study aimed to find techniques for using automatic big data RSS feed that is accessible online in mobile push notification and is freely available on the Internet. The programming technique method was applied for data acquisition, statistical process, and mathematical analysis. The outcomes pointed to a lack of study temperature changes on the local scale that provides insufficient information for decision making about tourism management in the local region. The results in this local level study tended to express decreasing temperature. This is not usually consistent with the IPCC scientific consensus summarization. This result could be involved with geography location and monsoon condition control. The temperatures did not have a significant effect on increase in the number of storms in the West Pacific Ocean. Sea surface temperature results were in agreement with global scale studies.

Keywords: Climate change, global warming, programming, RSS, temperature, tourism

Introduction

Tourism is an important economic sector in Thailand. Estimated revenues from tourism directly contributing to the Thai GDP was about 384,720 million dollars, ranging from 9 percent to 16 percent in 2013, and was expected to account for 19.3 percent (73,715 million dollars) in 2014 [1,2]. Thailand was the fifth ranked country in the world for people searching for a romantic setting for their honeymoon via Google in 2013 [3]. Chiang Mai, Bangkok, Pattaya, Phuket, and Koh Samui are famous tourist hub destinations and were the top 5 tourist attractions in Thailand. Bangkok was ranked number one of the top 20 destination global cities by international overnight visitors, with about 21.47 million visitors in 2016, and number two in the world for the top 20 most visited towns by MasterCard in 2015 [4,5]. The number one sightseeing attractions in Bangkok and Chiang Mai are bustling hives of tourism activity and marvelous places of historical significance and craftsmanship. Pattaya, Phuket, and Koh Samui are home to some of Thailand's most famous beach destinations for tourists. Climate change and weather conditions have a significant effect, not only on natural and cultural resources, but also the physical resources supporting tourism and visitation patterns [6,7].

Global warming is increasing the average temperature of the air near the Earth's surface and the ocean's surface. The temperature scenarios reported at the end of the 21st century, estimated relative to 1850 - 1900, were likely to exceed 1.5 to 2.0 °C and, relative to 1986 - 2005, likely to be within the range 0.3 to 4.8 °C [9]. Predicted global combined land and sea surface temperatures are expected to rise at least twice as much in the next 100 years [10]. Some areas of the world may have a chance of rising temperatures that are more extensive than the global average. The 100-year trend (1906 - 2005) of the air temperature near the worldwide ground average showed an increase of about 0.74 ± 0.18 °C [11]. Since the first report in 1990, evaluated predictions proposed a global average temperature rise per decade of

about 0.15 °C and 0.3 °C for 1990 - 2005. Model investigations indicate that, even if all radiative forcing agents had held constant in 2000, a forward warming direction would occur with a slow response of the ocean's control at a rate of about 0.1 °C per decade over the next 2 decades [12]. Rising Sea Surface Temperature (SST) increases the amount of atmospheric water vapor over the oceans. This water vapor feeds weather systems, producing precipitation. Patterns and storm events, including both rain and snowfall, also tend to change, increasing the risk of heavy rain and snow. The global temperature analyses from various leading organizations indicate that mean surface temperature rose 0.47 to 0.58 °C in 2005, above 1961 - 1990 [13]. The global surface temperatures in 2007 were likely to break the record for the warmest of the 30-year mean (1961 - 1990) [14]. It was one of the 2 warmest years in the temperature record since 1850. The warmest years on record, higher than annual surface temperatures, averaged 0.42 °C above the same 30-years mean [15].

The Japan Meteorological Agency analyzed and estimated this situation. The latest estimates were made in 2015, based on air-sea temperature data collected at meteorological stations over land and SST measured at sea. Both data were obtained by moored, drifting buoys and ships in the voluntary observing fleet. The global average near-surface temperature for 2015 was the warmest on record. It was about 0.76 ± 0.09 °C above the average during 1961-1990, and approximately 1 °C above the average during 1850-1900. The developing effects of El Niño in the Pacific Ocean may be combined with the long-term rise in global temperatures as a result of global warmth reaching record levels [16]. Recently, the World Meteorological Organization reported a new record warmest year of about 1.1 °C in 2016 above the pre-industrial period [17].

The main reason for this is that human activity primarily caused increasing temperature from greenhouse gas emissions. Scientists have suggested the effects of fossil fuel combustion from CO_2 and aerosols form a large part of this [18]. Despite affecting greenhouse gas levels, heat also affects the temperature of the sea water, which has continued to rise steadily for several millennia. SST has been increasing slower than land surface temperature, because the heat capacity of the oceans is higher than the loss of heat from land surface evaporation [19-21]. Other effects of global warming have resulted in several changes to the natural environment. This includes patterns and amounts of precipitation changes, ice and snow cover reduction, sea level rises, ocean acidity increases, frequency, intensity, and duration of extreme weather event increases, ecosystem characteristic shifts, and human health threat raises [9-12].

Global temperature rises play a significant role in the interaction between the atmospheric and ocean system. This systematic investigation aimed to study the effect of the coupling control of the atmosphere and ocean system in the local top 5 tourist attractions in Thailand. Thailand is located on a peninsula bordered by the Andaman Sea of the Indian Ocean westward of the peninsula. Meanwhile, the Gulf of Thailand is connected to the Western Pacific Ocean eastward of the peninsula. This is the central ocean which controls the climatic conditions of the study region.

The growth in Internet volume and complexity has furthered the information available online worldwide. Users encounter information overload [22]. Consequently, there has been a rise in the need for a new kind of information access and delivery design. Really Simple Syndication (RSS) technology has arrived over the past decade to serve the requirement of big data. RSS is an information distribution tool for websites to move away from online content showing the capacity of users and towards a wealth of information. There is no need to execute manual searches, and irrelevant subject matter and unwanted advertisements are filtered out [23]. A site or program collects group items of content and filters display only valuable online user content [24]. These are also sometimes called RSS aggregators. Various websites use RSS feeds to offer customized pages for users [25]. More and more specialists now use RSS feeds to show the quality or state of being different in innovative ways [26]. As a result, this investigation focuses on the use of online content RSS sources of weather website distribution. The main computational research question was an adoption of the RSS feeds by a specific root of weather website data content using the programming technique to find the tendency of critical rising temperatures in important tourism destination in Thailand. RSS is a source of big data available online. All data collection of air temperature in the top 5 attractions, SST in the Gulf of Thailand and the Andaman Sea, and the number of tropical cyclones in the Western Pacific Ocean were extracted as metadata by using the programming technique.

Materials and methods

Some current business tools contain data integration and support the extraction, transformation, and loading of business data into a valuable database [27]. This impacts this study as a cleaning procedure where a way of dealing with cleaning the unclean data process is used as a point from cleaning fixations, such as carefully chosen groups of keyword settings of the cleaning process, to produce a single clean data instance. Data cleaning often involves uncertainty or duplicates. Designing strict cleaning keywords and multiple alignments require solving the uncertain cases deterministically, which is usually done using fixed rules and domain experts. In this article, the focus was not on designing a new duplicate discovery technique with better quality, but on presenting an approach to query uncertainty in duplicate detection methods, with the objective of allowing for fixing in cleaning specifications.

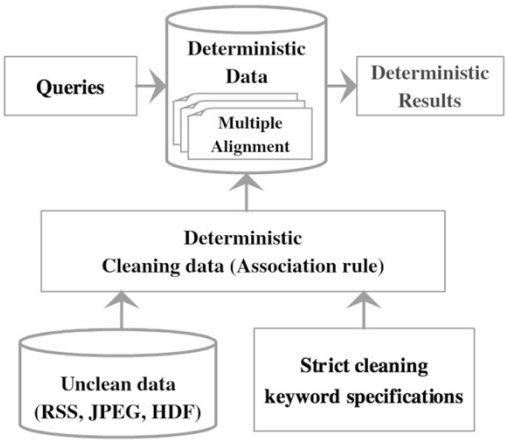

Figure 1 The working model flowchart.

Firstly, the unclean data needed to be defined and transformed to numerical and text format for each purpose, because some format data could not be computed. Especially, JPEG did not provide numerical and text format, but this problem could be challenged by using the image processing technique for converting color value to numerical value and assigning the part of the file name of each image as the date. Next, experts determined a group of keywords for location or position (latitude and longitude) or the day of the month or year as the number and assigned weather parameters as the text. The association rule supported pairing the group of keywords with the formal system of latitude, longitude, date, and weather parameters. The multiple alignments for all of the set of keywords can be approached by using functional programming, like a for loop to each file.

Association rule procedure

The most significant problems facing organizations is how to get value from the big data. This procedure helps to match and to find need and no need data by using the set of the keyword. In this concept, the processing method used the relationship discovery between the variables of interest in extensive unclean data. It aimed to recognize strong rule discovery in databases using exotic procedures [28]. According to the regulate concept, declared association rules for revealing patterns between excellent relations recorded data products by the point of a display system [29]. An association extraction study was automatically assembled and indexed with categories in the big data domain. It was performed on the indexed data in the keyword sets representing the date and location metadata. All known producing association rules procedures operated in 2 phases. A collection of keywords was $K = \{k_1, k_2, ..., k_n\}$. A set of indexed documents was $I = \{i_1, i_2, ..., i_n\}$. The associate extraction substantial carried and compressed

the keyword sets concerning the collection *I*, and confidential value was executed. The engendered keyword sets were called the regular sets. They were assembled incrementally by starting from single keyword sets and progressively adding elements to the keyword sets as long as they satisfied the confidential constraints. Regular set collection was the most computational power or exponential step. Heuristic and incremental procedures were regularly examined.

The big datasets

RSS feed is a favorite social media tool, with library programs and services for obtaining its local communities by automatic syndicating its web content, including daily weather news aggregation. RSS feeds also benefit from receiving timely updates to gather weather data from many sites [28]. The programming structure can also be controlled to automatically download weather data. Available online hourly weather data have many formats for use in this investigation. To collect the matrix history of data record the weather API feed subscribers access to weather data locations via a simple web interface of more than 3.5 million locations and more than 30 parameters for hourly data from the year 2000 to the present. Compelling data of about 20 million records were processed from the databases by using functional programming language.

The first big data RSS weather dataset was contributed by Unisys Headlines and Weather Underground [30,31]. The web page contents were the data display, hyperlinks, image links, images, plain text, source, title, and XML object. The clean procedure of programming was applied to select weather information for more than one line of text at a time, which typically included temperature, pressure, visibility, clouds, heat index, dew point, humidity, and rainfall. The data was also acquired in a web-based Git, or version control repository, and the Internet hosting service or GitHub repository [32]. These could customize any exotic location by using GET parameters to update every second, minute, hour, day, month, or year. The massive complexity of the amounts of weather data were of several types of evidence obtained from various subdomain websites at several times, but examined together. Enormous quantities of data could be processed by a programming algorithm to scrutinize information in the study.

The second, an available-online SST in Hierarchical Data Format (HDF) from the National Oceanographic Data Center, was a set of big data RSS content file formats designed to assist users in the storage and management of scientific data across different machines and operating systems [33,34]. These data are often accompanied by metadata files that describe the contents of individual files of the data. The location information of the data was collected as the satellite passed and the contents contained in the metadata file. Over time, numerous images of the same global location were acquired. These compositions of the same area were compared over time for many proposed analyses, to ascertain SST distribution patterns and water vapor images over the Western Pacific Ocean. The metadata relating to these images could be parsed, and a list of files made according to a searched position from familiar locations. The large number of RSS in HDF format data were extracted to and changed into a binary standard format and processed into an initial weather parameter by using a programming algorithm (**Figure 2**).

The programming procedure handled each unlimited variation dataset. The compositions of the same area were compared over time for many proposed analyses to ascertain SST distribution patterns and water vapor images over the Western Pacific Ocean. Both water vapor in JPEG images and SST in HDF format specified the geographical position coordinates in order to generate metadata for an attractive area. The computer function supported this, to specific any coordinate location in the world that illustrated part of the programming code, as shown in **Figure 2**.

```
STTdate[lat_, lon_, fn_] := Module[{}, {rw, col} = {Round[LatFunc[lat]], Round[LonFunc[lon]]};
  temp = (Join[{extractDate[#1]}, {Reverse[Import[#1, "Data"][[1]]][[rw, col]]/100.`}] &) /@ fn]
```

Figure 2 The SST extract metadata algorithm.

The location or position was specified in the matrix of data as lat and lon (latitude and longitude). LatFunc and LonFunc were used to check the format system of latitude and longitude that was denoted as rw (row) and col (column). The high-volume number of data was declaring as fn (file name) list. The date was specified by using another functional program, extractDate. In this file name, the matrix of the list provided the structure of the algorithm or the sequence of steps. It was closer to a for loop for each file than an actual list. The metadata result was a dirty data that needed to be placed into the data cleaning process.

Finally, the US Naval Research Laboratory provided the Joint Photographic Experts Group (JPEG) format of big data RSS crawlers, or playlist content, for the study [35]. The image sets on water vapor in the Western Pacific Ocean were served online every 30 min. More than a hundred thousand files of image data were automatically imported into the programming function for processing in order to extract metadata about color value that displayed part of the code, as shown in **Figure 2**. The function interpreted color value to the amount of the solar radiation value. The amount of solar radiation was later correlated to the air temperature.

```
extractPixel[loc_, fn_String] := Module[{int, day, lonX, latY, site, sel, sel2, pxVal},
  img = ToHSVColor[ImageRead[fn]];
  hsv = Take[img[[1, 2]], {25, 995}];
  int = Interpolation[Table[{(N[Length[hsv]/255])*i, i}, {i, 0, 255}]];
  val = Table[{hsv[[i]], Table[int[i], {i, 1, Length[hsv]}][[i]]}, {i, 1, Length[hsv]}];
  day = extractDate[fn];
  lonX = Round[lonFunc[#[[2]]]] & /@ loc;
  latY = Round[latFunc[#[[3]]]] & /@ loc;
  site = {#[[1]], {#[[2]], #[[3]]}, day} & /@ loc;
  sel = Table[Select[val, (#[[1, 1]] ≤ img[[1, latY[[i]], lonX[[i]]]][[1]]) &], {i, 1, Length[latY]}];
  sel2 = Table[Select[sel[[i]], (#[[2]] == Max[sel[[i]][[All, 2]]]) &], {i, 1, Length[latY]}];
  pxVal = Table[{site[[i]], sel2[[i]]}, {i, 1, Length[latY]}]]
```

Figure 3 The JPEG format extract metadata programming process.

The location was specified in the matrix of data as loc (latitude and longitude location). This was needed to transform image value data to HSV value color and interpolate it to interesting HSV numerical information. The next processes were those of finding or matching or aligning the date and location in each file name (fn).

Many hypotheses indicated the increasing amount of population, with subsequent increase in demand on energy and resources. The results were sensitive to changes in weather and climate [9-12,36]. The programming language was of a typical architecture to allow the possibility of an exclusively useful approach to working with statistical reports. Symbolic coding began with an arbitrary representation of fit models from a full spectrum of results and diagnostics, which could be immediately extracted, visualized, or used in other computations. Recently, several statistical research works have been accomplished, based on significant data analysis [37].To address the subject, this study has developed a programming technique to examine weather and climate information to identify potential vulnerabilities in tourism factors stemming climate change.

Data processing

In general knowledge, discovery frameworks of data processing techniques were usually sets of procedures on data used by a computer to retrieve, transform, classify information, and summarize. This study method was dedicated to information extraction from the various types and sets of weather and climate data. Alternatively, data processing techniques were devoted to information extraction from unstructured textual information as a simulation tool for the enhancement of information extraction procedures. The processing system was related to a consolidation of transformations, converting data to another format. The list of data was arranged in different series by summarization, by dropping element data to its significant points for validation, or by confirming supplied data to be accurate and useful. It was also aggregated or merged with various pieces of data for analysis by collection or organization or by interpretation and presentation of data.

First, data processing of the generous amount of big data available worldwide could handle tens of millions of data shared online. These were not data entered into the forms or verified by a related database. The number of differences was beyond the expectations of all the standard binary deduction or illegal encryption binaries posting as HTML or XML tags. The amount of variations was endless. The data programming needed to produce architectures that were extraordinarily robust in the face of unexpected distinctions in data. Standard practices were to include fallbacks, quarantine procedures, and endless rounds of investigation data. Things to avoid about batch processing practices were importing files of different formats into the unstructured textual database. The new data incoming would not break the pattern of original data. This technology can maintain the original state of the data.

Second, data processing supported uncertainty of data formats and structures, which solved the extent of the iterate problem, and began to attack the backlog. This involved customizing and creating unique increasingly intense subsets. The data processing designed systems with the up-front expectation that multiple approaches were required. It used techniques which work well in uncertain environments. For example, a duplicate sample-checking statistical evaluation of files, query processes, and automated regression tests. Each of these techniques could be used to provide supervision in uncertain target resources.

Third, a new database will be required in future, which further increases the need for an entirely new system or new source database available. The series of data was not fixed at the last minute. This architecture could also allow for fast and slow replacement of resources. For example, one of the customizations discovered that a weather data RSS feed vanished under control conditions. Some data providers switched data sources half-way through the project, or added many more data sources to a system than initially envisaged. The data processing framework could perform with even a dramatic change. Metadata could be gathered from the feed content over the same operation and significantly improve the quality of metadata extraction.

Finally, flexibility was key to data processing- for example, to write a program to handle an array of problems instead to having to write a program to handle a single problem; to change the source code to add a new weather data collection as an alternative to changing configuration files; and central controlling files for system configuration could be regularly updated as new weather data collections were added. Those configuration files were chopped into pieces, with one per collection, to improve configuration control and increase the independence of groups. The technologies statement was designed to process architectures that worked with any of the data providers, and which allowed changing significantly, without having to use a new code deployment. Even better, new collections could be added and processing components upgraded dynamically without a reboot or the need to affect other processors.

Results and discussion

The problem statement of the JPEG image data did not give numeric data to give precise geographic location. The image comprised only color information on the map. The results of this section focus on the image processing technique to receive the numerical value of weather parameters and geographic locations from thousands of pictures. The average temperature comparison on the top 5 tourist attractions in Thailand, shown in **Figure 4**, illustrated the correlation between the text RSS feed and JPEG images

during 2002 - 2016. There was a different source of data. Some missing data could have used another source of data for replacing or repairing. The X-Y scatter charts displayed high correlation of about 0.97. That means the data obtained from the image processing of the program was related to the data from the RSS text feed. It confirmed that the image processing program was well capable of converting image data into numerical data. However, each derived image may have different color values, representing various digital data. Then, it is necessary to calibrate the index value of the color values in the image processing to be consistent with the numerical data required. Therefore, the study of another category of weather, in addition to the digital data taken directly from the RSS feed, can also use the JPEG image data in order for it to be processed efficiently.

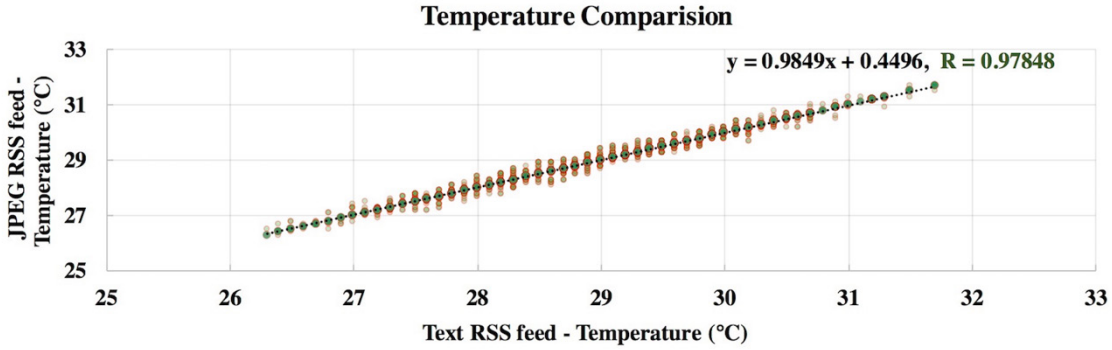

Figure 4 Average temperature comparison of RSS feeds in JPEG format and text format (2002 - 2016).

Thailand became a newly industrialized country and a significant exporter in the 1990s. Manufacturing, agriculture, and tourism were leading sectors of Thailand's economy [38]. Coastal areas and tourism played a vital role in the economy. Climate change and weather factors were a threat to critical economic sectors. The higher frequency impact of unusual weather conditions may have been caused by global warming, in which surface temperatures and sea levels rise, and floods, droughts, and severe storms occur. This extensively damages agriculture and coastal tourism more than it does the crucial sector of the economy directly. The available information on low or high weather impacting values on a global scale had an unclear effect on the small scale of a local area in Thailand. The loss of agricultural and coastal production was used to refer to climate change scenarios to yield low or high estimates of the potential economic impacts due to climate change [39].

The central tendency can be used to inform a broader understanding of climate change, or to consider how the climate may change or progress in the future. Location statistics represent where the data is located. The several common functions involve measures of central tendency like the mean, median, and mode [40]. Numerous comparisons of central tendency with an object of known size can attempt to determine what might variously be termed the average value of a dataset, including the concept of a slope being central to differential calculus. The slope or gradient of the line describes the direction or tendency of the line [41]. The temperature dataset measurement, of about ten years in this study, used the mean to express the central tendency of the sample distribution and the spread of the data. In addition, trends or directions of the average temperature line were considered. The mean central tendency and direction of temperature data for about ten years is displayed in **Figures 5 - 9**. However the climate change influence was not expressed in sudden effects for the current year in Thailand, unless the climate change occurred gradually over 50 to 100 years.

The products of big data RSS feed and processing techniques toward the fundamental study of global warming was demonstrated by relating the temperature tendencies at the main attraction on a local scale in Bangkok, Chiang Mai, Pattaya, Phuket, and Koh Samui. It also was shown to consider the highest temperature of the year. Numerical evaluation of all temperature indicators found continuous function of

x of less than or equal to zero, as generally described in the temperature tendency decreasing in Bangkok, Pattaya, and Phuket. There was a small rise in tendency found in Chiang Mai and Koh Samui. Furthermore, there was no occurrence of unusually high temperatures. Some primary results argued with the conclusions of more than 30 institutions of scientific associations and organizations [42]. However, some scientists disputed the conclusions of the scientific consensus on the current climate change, because it was not possible to project global climate accurately enough to justify projecting the difference in conditions between the upper and lower limits on a particular scale of temperature and sea level rise over the next century. This included global warming mainly caused by natural processes, and no primary cause was attributed to the observed rising temperatures. Moreover, projected rising temperatures will be of slight impact or a net positive for the environment [43].

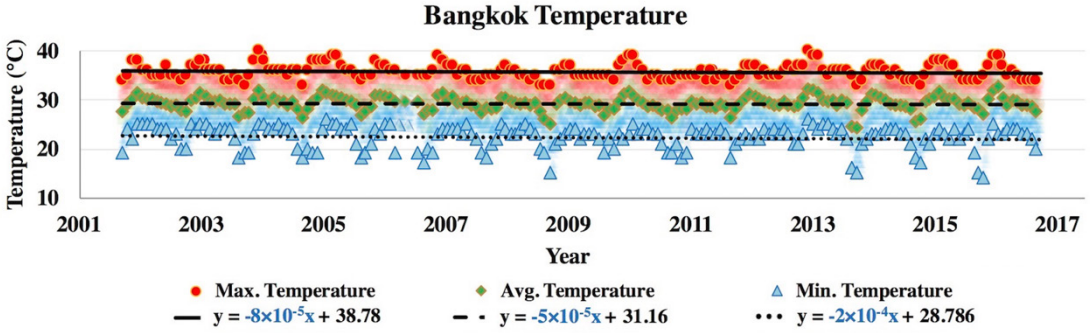

Figure 5 Temperature tendency in Bangkok (2002 - 2016).

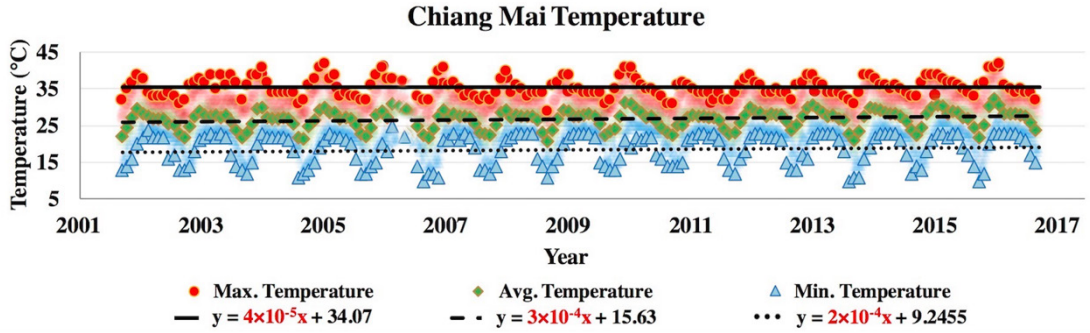

Figure 6 Temperature tendency in Chiang Mai (2002 - 2016).

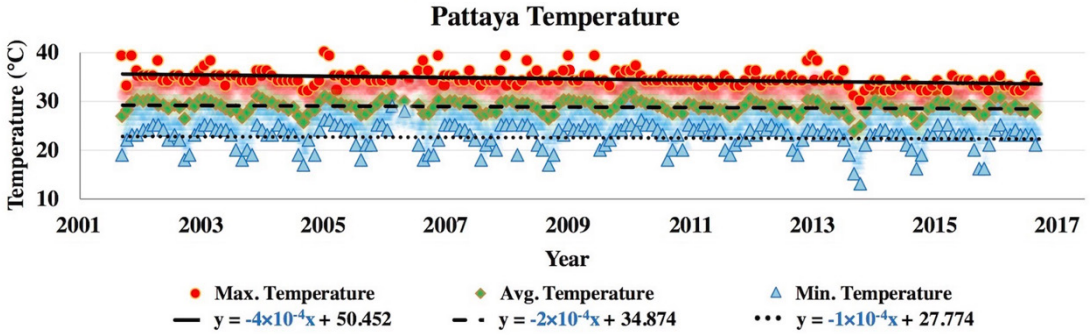

Figure 7 Temperature tendency in Pattaya (2002 - 2016).

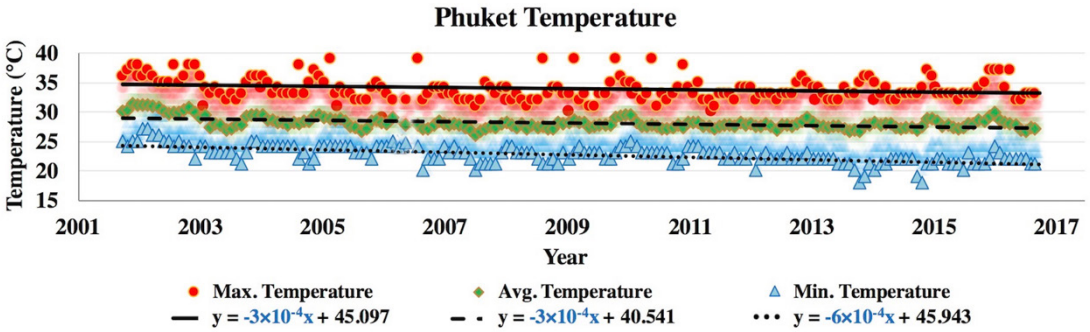

Figure 8 Temperature tendency in Phuket (2002 - 2016).

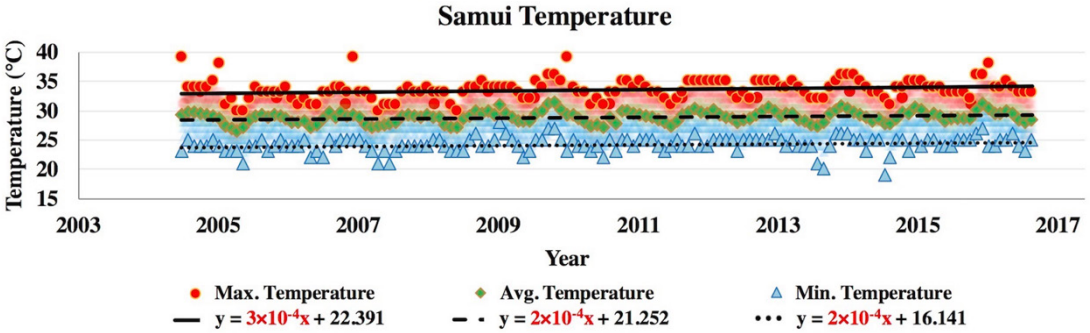

Figure 9 Temperature tendency in Koh Samui (2004 - 2016).

The necessary cause of disagreement on a general global scale was probably because the Thailand region is located in the area of the peninsula between the Indian Ocean and the Pacific Ocean. The vast ocean water mass warm up and cool down more slowly than air does. It plays an important role in controlling the take up of energy from the Sun and the principal function of regulating the air temperature of the peninsula region and preventing it from getting too hot. The northeast and southwest monsoon has the most potent influence in this region. The southwest monsoon is generally expected to begin around the beginning of June and fade away by the end of September. The moisture-laden winds, on reaching the southernmost point of the peninsula, give a possibility of clouds and precipitation along the west coast of the southern area of Thailand. The northeast monsoon is around September, with the sun fast receding to the southern hemisphere. As a result, the northern land mass of the China subcontinent begins to cool off rapidly. This air mass pressure movement starts to build over China to Thailand. The cold air mass

sweeps down from a high latitude of China towards the vast spans of low latitude heating area of Thailand. Especially, the north to the central parts of Thailand received colder temperatures. The south of the country, between the Indian Ocean and the Gulf of Thailand, still held its heat. Then, a dry cooler air mass striking moist warm air mass over the Gulf of Thailand was also influential in another form as large cloud cover and rain along the east coast of the south of Thailand.

Moreover, SST has been discovered to have a positive continuous function of x more than zero about 10^{-5} (**Figure 10**). This was a low impact indicator for SST increasing during 2000 to early 2017, though it was likely to increase from anomalies (**Figure 11**) as a direct result of the measurement and forecast on the global scale [44]. The ocean temperature, especially the surface, varied from place to place and season to season, which depended on the amount of solar energy absorbed and the ocean circulation. Ocean circulation acted like a conveyor line, carrying warm water from the equator to the poles and exchanging the cold water from the poles to the tropics [45]. El Niño was a climate cycle, with a global impact on weather patterns in the Pacific Ocean. It was also responsible for the recently elevated global SST in 2016. The ocean controlled global climate to help cope with the unequal solar radiation distribution reaching the Earth's surface. Thus, the Indian Ocean controlled temperature around Phuket. Koh Samui and Pattaya were regulated by sea circulation in the Gulf of Thailand that connected to the Pacific Ocean. Both areas had a movement of SST linked to an enormous extent ocean circulation.

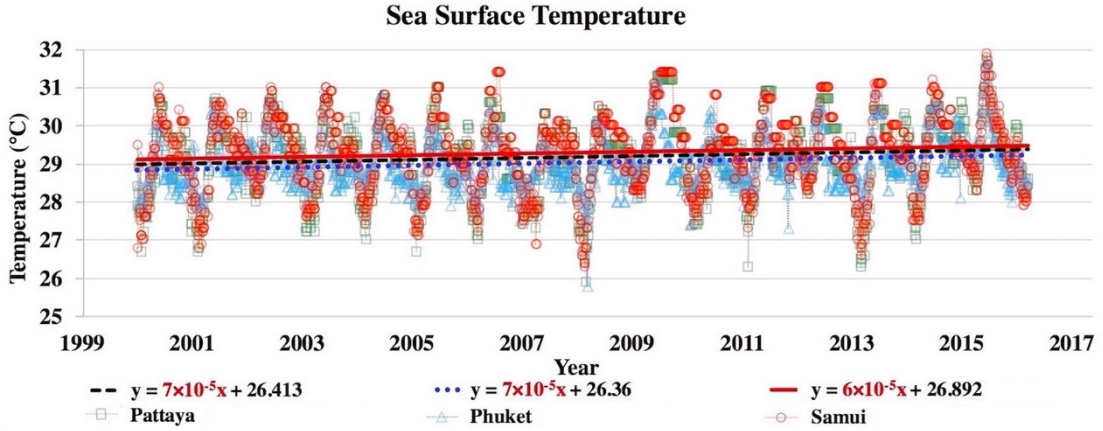

Figure 10 SST tendency around Pattaya, Phuket, and Koh Samui (2000 - 2016).

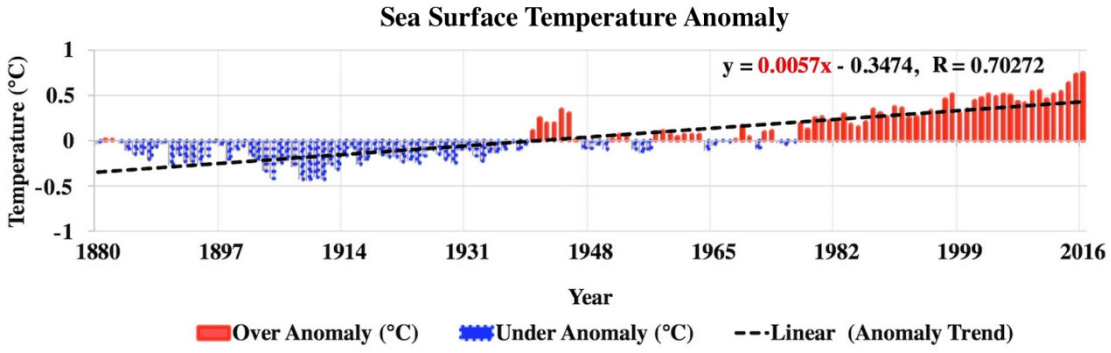

Figure 11 Global SST anomalies (1880 - 2016).

SST changes can shift storm pathways and potentially contribute to droughts in some areas. Some of these changes were less precise than the changes associated with temperature. In future, precipitation and wind changes will vary by season and region. Some areas may have more precipitation, some parts may have less precipitation, and some sections may have little or no change. The rainfall quantity in rain events is likely to increase in most regions, while storm tracks are projected to shift poleward [10].

Global warming and climate change cause a global increase in hurricane intensity [46-48]. It was essential to analyze the frequency, intensity, duration, and timing of severe weather that changed with rising temperatures [49]. Typhoons in the west of Pacific often directly affected Southeast Asia and Thailand. There was no substantial evidence to support severe weather becoming stronger, more frequent, or more widespread during the past 50 years in Thailand. One of the reasons is that severe weather was hard to track in fact reporting systems. According to the study, the frequency number of storms corresponded to the polynomial function in **Figure 12**, with frequent and seemingly non-threatening severe storms during 1970 to early 2017. The frequency number of storms based on the mathematical equation showed higher amounts of storm in the next few years. The tendency may be for the occurrence of a high number of the storms, about 40 - 44, during 2017 - 2019. Nevertheless, the number of storms, as per mathematical equation analysis, will decrease afterwards.

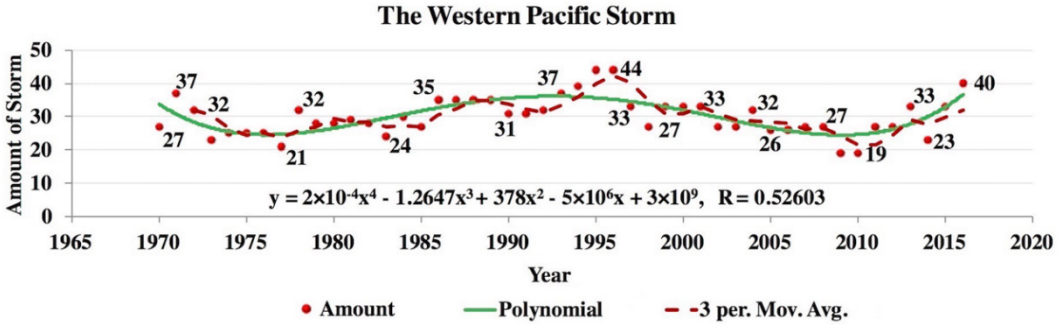

Figure 12 Amount and tendency of storms in the Western Pacific Ocean.

Assessment of climate change and global warming affecting tropical cyclones was essential, regarding emergence and route tracking. Tropical cyclone activity was affected by changes in SST, such as the El Niño Southern Oscillation, and SST changed the frequency of tropical cyclones in the Ocean [50]. So, it was wise to make a note of the trends and long-term impacts of SST on the frequency of cyclones in the Ocean. Recent publications related the increase in the severity of tropical cyclones to the cause of the increase in SST [51]. It was caused by global warming [52]. The amount of vertical mixing occurring in the ocean controlled the degree of ocean heat transport distribution. The frequent tropical cyclones exaggerated mixing to a high enough level, producing the ocean temperature balance [53].

Therefore, the ocean expands more heat to ocean circulation areas if the mixture risings. Additionally, greenhouse gas concentrations were will be at higher levels in future. These gases force temperatures to rise, and the amount of water vapor in the air to increase, because of increasing evaporation incidence. Both the increase in moisture in the atmosphere and the higher temperature will encourage more tropical cyclones to form. The thunderstorm danger level 4 and 5 caused by rising temperatures [53]. This study investigated the state of tropical storms, air temperatures, and SST results from global warming. Tropical storms were directly interrelated to temperature rising. However, wind shear from the Coriolis effect acts to reduce violent storms [54]. If global warming were an essential primary effect of control of the average global temperatures at the Earth's surface rising, then the number and frequency of tropical storms, the air temperatures, and the SST at any region of Thailand would increase continually, but this did not at all happen in Thailand.

Conclusions

In this article, local weather and climate conditions from RSS feeds, based on programming algorithm, has been developed. The temperature variability calculated tendency of climate change, and global warming in the local region was essential to develop an understanding of the impact of climate change and global warming in the SST that affects the atmosphere and the ocean system. The temperature change was related to a large area in both the atmosphere and the ocean [55]. It was also imperative to the ecology system and economic sectors [1]. The variability of temperature over the long term, global warming, and climate change on a regional scale has been documented and studied inadequately to the present. Most studies focused on areas on a global scale, and found the temperature rising around the world [9,11]. These study results were confirmation of some local areas in the top 5 attractions in tourism areas. The temperatures did not rise as high as the overview of the global scale study. There was no peer-reviewed literature available on the impact of climate change on tourism in Thailand. Some research on climate change and beach tourism has received considerable attention within international research [56,57]. Some research indicated that tourists favor countries with a mild sunny climate [58].

In general, global warming and climate change were not likely to cause trouble for the coastal tourism sector or the overall tourism industry. Thailand remains a fascinating country for tourism, while there may be increased risks and opportunities for seasonal activities [59]. Summer in Thailand is followed by rainy and high cloud coverage and cools things down considerably for a short period. However, the short time of the rainy season is unsuitable for tourism activities. The main topic of the global warming and climate change situation could be considered to be the evaluation of creating habitat options for tourism expansion. It involves the best area along the east coast and the west coast of Thailand. Bangkok, the capital of Thailand, is still suitable for business investment or creating relaxation areas because all trends of the temperatures are not rising. Chiang Mai and Koh Samui provide quiet opportunities to discover new highest temperatures. Conversely, Pattaya and Phuket do not receive the effect of climatic variation. These are still a good choice for tourist destination developments and provide accommodation for the increasing tourism requirement and human recreation. It will provide an excellent opportunity to increase the GDP of the country in the tourism industry sector in this region.

The connection between the tourism community and the environment is an under-researched area. This study extended a model that establishes theoretical relationships between critical physical weather variables and the attractiveness of a tourism destination. Climate change and global warming can either positively or negatively control the attraction of tourism destinations [59], and a cross-country tourism interest model can be reinforced with relative tourism climatic indices to investigate the influence of Thailand's climatic features. It is necessary to evaluate and produce potential strategies to counter any potential threats to the industry.

One potential threat to the tourist industry, in terms of future viability, has been identified in recent years as climate change and global warming intimidations. These have possible influence on both sides of the demand and supply tourist product [60]. On the demand side, a change in climatic features could lead to a shift in visitor patterns, while on the supply side, as well as tourist attractions, the increasing frequency and intensity of tropical storms could reduce biodiversity, as well as lead to damage to hotel plants. However, the severity of tropical cyclones seen in this study displayed no effect in Thailand. It only has an effect in the form of monsoons as the rainy season. The Thailand tourism industry has been a dominant generator of mass jobs for the region. The tourism government sector has an essential part to play in promoting the best conditions for the private sector to increase in a way that allows communities to benefit. This study provides evidence that indicates the overall global warming and climate change have not had a negative influence on the attraction of tourism destinations to Thailand. So, projections on the expected impact of this study information should be a strategy to use to refer to when fostering top-rated tourist attractions, because tourism has great potential to boost economic development in Thailand.

References

[1] R Turner. *Travel & Tourism Economic Impact 2015 Thailand*. WTTC, London, 2015, p. 1-3.
[2] Bangkok Post. Government Moves to Head Off Tourist Fears 2015. Available at: http://www.bangkokpost.com/archive/government-moves-to-head-off-tourist-fears/666028, accessed September 2017.
[3] Travel Breaking News. Thailand Ranked Fifth in Worlds Top 10 Honeymoon Destinations. Available at: https://www.travelbreakingnews.net/2014/02/thailand-ranked-fifth-in-worlds-top-10-honeymoon-destinations, accessed December 2017.
[4] Y Hedrick-Wong and D Choong. *Global Destination Cities Index*. MasterCard, New York, 2016, p. 1-7.
[5] Y Hedrick-Wong and D Choong. *MasterCard 2015 Global Destination Cities Index*. MasterCard, New York, 2015, p. 7-11.
[6] B Amelung and A Moreno. *Impacts of Climate Change in Tourism in Europe*. PESETA-Tourism Study, European Commission, Seville, 2009, p. 1-55.
[7] B Amelung, S Nicholls and D Viner. Implications of global climate change for tourism flows and seasonality. *J. Travel Res.* 2007; **45**, 285-96.
[8] NA Fisichelli, GW Schuurman, WB Monahan and PS Ziesler. Protected area tourism in a changing climate: will visitation at US national parks warm up or overheat? *PLoS One* 2015; **10**, e0128226.
[9] IPCC. *Climate Change 2014: Synthesis Report Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC, Geneva, Switzerland, 2014, p. 56-74.
[10] IPCC. *Climate Change 2013: The Physical Science Basis Exit Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, USA, 2013. p. 192-4.
[11] IPCC. *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, USA, 2007, p. 35-58.
[12] D Hafemeister. *Physics of Societal Issues: Calculations on National Security, Environment, and Energy.* 2nd ed. Springer Science & Business Media, 2013, p. 290-1.
[13] World Meteorological Organization. *WMO Statement on the Status of the Global Climate in 2005*. WMO, Geneva, Switzerland, 2006, p. 4-5.
[14] Science Daily. Top 11 Warmest Years on Record have all been in Last 13 Years. Available at: http://www.bangkokpost.com/archive/government-moves-to-head-off-tourist-fears/666028, accessed December 2017.
[15] XG Xin, TW Wu and J Zhang. Introduction of CMIP5 experiments carried out with the climate system models of Beijing climate center. *Adv. Climate Change Res*. 2013; **4**, 41-9.
[16] World Meteorological Organization. *WMO Statement on the Status of the Global Climate in 2015*. WMO, Geneva, Switzerland, Rep, 2016, p. 2-5.
[17] World Meteorological Organization. *WMO Statement on the State of the Global Climate in 2016*. WMO, Geneva, Switzerland, 2017, p. 3-7.
[18] KV Schuckmann, MD Palmer, KE Trenberth, A Cazenave, D Chambers, N Champollion, J Hansen, SA Josey, N Loeb, PP Mathieu, B Meyssignac and M Wild. An imperative to monitor Earth's energy imbalance. *Nat. Clim. Change* 2016; **6**, 138-44.
[19] TM Smith and RW Reynolds. Extended reconstruction of global sea surface temperatures based on COADS data (1854-1997). *J. Climate* 2003; **16**, 1495-510.
[20] NA Rayner, P Brohan, DE Parker, CK Folland, JJ Kennedy, M Vanicek, TJ Ansell and SFB Tett. Improved analyses of changes and uncertainties in sea surface temperature measured *in situ* since the mid-nineteenth century: The HadSST2 dataset. *J. Climate* 2006; **19**, 446-69.
[21] TM Smith and RW Reynolds. A global merged land-air-sea surface temperature reconstruction based on historical observations (1880-1997). *J. Climate* 2005; **18**, 2021-36.
[22] PJ Korhonen, P Malo, T Pajala, N Ravaja, O Somervuori and J Wallenius. Context matters: The impact of product type, emotional attachment and information overload on choice quality. *Eur. J.*

Oper. Res. 2018; **264**, 270-9.
[23] R Hrastnik. Unleash the Marketing & Publishing Power of RSS. Available at: http://www.electronic-illusions.be/wp-content/uploads/2011/03/rss_interviews.pdf, accessed January 2018.
[24] W Richardson. Blogging and RSS- The "What's It?" and "How to" of Powerful New Web Tools for Educators. Available at: http://www.infotoday.com/MMSchools/jan04/richardson.shtml, accessed January 2018.
[25] D Morgan. RSS Advertising, Coming Fast. Available at: https://www.clickz.com/rss-advertising-coming-fast/78326, accessed January 2018.
[26] A Agarwal. Top technology RSS feeds. Available at: https://blog.feedspot.com/technology_rss_feeds, accessed January 2018.
[27] Oracle. Oracle Data Integrator. Available at: http://www.oracle.com/technetwork/middleware/data-integrator/overview/index.html, accessed December 2017.
[28] D Ma. Use of RSS feeds to push online content to users. *J. Decis. Support Syst*. 2012; **54**, 740-9.
[29] R Agrawal, T Imieliński and A Swami. Mining association rules between sets of items in large databases. *In*: Proceedings of the 1993 ACM SIGMOD International Conference on Management of Data, Washington DC, USA, 1993, p. 1-566.
[30] Unisys Headlines. Hurricane/Tropical Data. Available at: http://weather.unisys.com/hurricane/index.php, accessed December 2017.
[31] The Weather Company. Weather Underground. Available at: https://www.wunderground.com. December 2017.
[32] GitHub. GitHub Guides: Hello World 2016. Available at: https://guides.github.com/activities/hello-world, accessed December 2017.
[33] N Karl. *Parsing Hierarchical Data Format (HDF) Files*. ACM New York, USA, 2010.
[34] National Oceanographic Data Center. Access data. Available at: https://www.nodc.noaa.gov/access/index.html, accessed December 2017.
[35] US Naval Research Laboratory. Satellite Meteorology. Available at: https://www.nrlmry.navy.mil/sat_products.html, accessed December 2017.
[36] TR Knutson and RE Tuleya. Impact of CO_2-induced warming on simulated hurricane intensity and precipitation: sensitivity to the choice of climate model and convective parameterization. *J. Climate* 2004; **17**, 3477-95.
[37] SE Ahmed and B Yüzbaşı. Big data analytics: Integrating penalty strategies. *Int. J. Manag. Sci. Eng. Manag*. 2016; **11**, 105-15.
[38] World Bank. Thailand 2016. Available at: http://www.worldbank.org/en/country/thailand, accessed January 2017.
[39] E Haites, D Pantin and M Attzs. *Assessment of the Economic Impact of Climate Change on CARICOM Countries*. Toronto, Canada, 2002.
[40] A McCluskey and AG Lalkhen. Statistics II: Central tendency and spread of data. *Cont. Educ. Anaesth. Crit. Care Pain* 2007; **7**, 127-30.
[41] C Clapham and J Nicholson. *The Concise Oxford Dictionary of Mathematics*. 4th ed. Oxford University Press, 2009, p. 347-9.
[42] Wikipedia. Scientific Opinion on Climate Change 2017. Available at: https://en.wikipedia.org/wiki/Scientific_opinion_on_climate_change#cite_note-7, accessed December 2017.
[43] Wikipedia. List of Scientists Opposing the Mainstream Scientific Assessment of Global Warming 2017. Available at: https://en.wikipedia.org/wiki/List_of_scientists_opposing_the_mainstream_scientific_assessment_of_global_warming#Scientists_arguing_that_the_cause_of_global_warming_is_unknown, accessed December 2017.
[44] B Huang, PW Thorne, TM Smith, W Liu, J Lawrimore, V F Banzon, HM Zhang, TC Peterson and M Menne. Further exploring and quantifying uncertainties for extended reconstructed sea surface temperature (ERSST) version 4 (v4). *J. Climate* 2015; **29**, 3119-42.
[45] P Niiler. Chapter 4.1 The world ocean surface circulation. *Int. Geophys*. 2001; **77**, 193-204.
[46] JA Curry, PJ Webster and G Holland. Mixing politics and science in testing the hypothesis that greenhouse warming is causing a global increase in hurricane intensity. *Bull. Am. Meteorol. Soc.*

2006; **87**, 1025-37.
[47] NASA. Competing Forces Muddle the Picture. Available at: http://earthobservatory.nasa.gov/Features/ClimateStorms/page4.php, accessed December 2017
[48] E Meghan. Is Climate Change Causing more Powerful Tornadoes? Available at: http://www.accuweather.com/en/weather-news/severe-weather-and-climate-change/62715, accessed December 2017
[49] USGCRP. *Climate Change Impacts in the United States: The Third National Climate Assessment*. US Government Printing Office, 2014.
[50] SJ Camargo and AH Sobel. Western north pacific tropical cyclone intensity and ENSO. *J. Climate* 2005; **18**, 2996-3006.
[51] CW Landsea, BA Harper, K Hoarau and JA Knaff. Can we detect trends in extreme tropical cyclones? *Science* 2006; **313**, 452-4.
[52] RA Pielke, C Landsea, M Mayfield, J Laver and R Pasch. Hurricanes and global warming. *Bull. Am. Meteorol. Soc*. 2005; **11**, 1571-5.
[53] GFDL. Global Warming and Hurricanes. Available at: https://www.gfdl.noaa.gov/global-warming-and-hurricanes, accessed June 2017.
[54] GA Vecchi and BJ Soden. Increased tropical Atlantic wind shear in model projections of global warming. *Geophys. Res. Let.* 2007; **34**, L08702.
[55] D Smirnov, M Newman and MA Alexander. Investigating the role of ocean-atmosphere coupling in the North Pacific Ocean. *J. Climate* 2014; **27**, 592-606.
[56] A Moreno. Mediterranean tourism and climate (change): A survey-based study. *Tour. Hos. Plan Dev*. 2010; **7**, 253-65.
[57] A Bigano and JM Hamilton. The impact of climate on holiday destination choice. *Clim. Change* 2006; **76**, 389-406.
[58] A Moreno and B Amelung. Climate change and tourist comfort on Europe's beaches in summer: A reassessment. *Coast Manag*. 2009; **37**, 550-68.
[59] MJ Hewer and WA Gough. Thirty years of assessing the impacts of climate change on outdoor recreation and tourism in Canada. *Tour. Manag. Perspect.* 2018, DOI: 10.1016/j.tmp.2017.07.003.
[60] J Rosselló-Nadal. How to evaluate the effects of climate change on tourism. *Tour. Manag.* 2014, **42**; 334-40.